

## Introduction

Transportation agencies promote economic growth through infrastructure development. When road and bridge construction is proposed, an environmental impact assessment is conducted to determine the potential threat that a given project has on sensitive species or ecological areas. Wildlife agencies are especially concerned when construction of road-crossings over streams is proposed because of the variety of adverse effects those activities can have on the aquatic environment. Sedimentation, channelization, and stream bank modifications are potential products of bridge and culvert construction that can be detrimental to local aquatic fauna (Little and Mayer 1993; Forman and Alexander 1998).

Unionids are among the most endangered groups of animals in North America. About 67% of the nearly 300 freshwater mussel species found in North America are considered vulnerable to extinction or already extinct (Bogan 1993; Williams et al. 1993). The decline of mussel populations in North America has occurred steadily since the mid 1800s and has been attributed to construction of dams and impoundments, sedimentation, navigation, pollution, and habitat degradation (Fuller 1974; Bogan 1993; Neves 1997; Brim Box and Mossa 1999; Vaughn and Taylor 1999). The surface waters of North Carolina have historically supported 56 species of unionid mussels (Bogan 2002). Today, 82% of these species are listed as endangered, threatened, or of special concern by the U.S. Fish and Wildlife Service or the State of North Carolina (Code of Federal Regulations 1993; NC Wildlife Resources Commission 2002); several are already extinct. Many of the same human-mediated and environmental factors responsible for the declines of freshwater mussels throughout North America have also contributed to the declines in North Carolina's 17 river basins.

Short-term effects of bridge and culvert construction activities have been documented to impact stream insects (Ogbeibu and Victor 1989) and fish (Barton 1977). Sedimentation, a potential consequence of bridge construction, has been shown to be detrimental to mussel populations (Ellis 1936, Marking and Bills 1979). However, the long-term effect of road-crossings on mussels is poorly documented. During construction storm events can flush construction-related sediments from a site (Taylor and Roff 1986) into adjacent streams. After construction a crossing structure remains in place and serves as a conduit for the movement of road runoff from road surfaces into surface waters, and runoff from paved surfaces has been associated with freshwater mussel declines (Williams et al. 1993).

**The goal of this study was to assess the impact of road runoff on mussel populations. Specific objectives were to:**

- 1) identify the contaminants in road runoff that are entering NC streams,**
- 2) develop non-lethal field sampling techniques for assessing the health of freshwater mussel populations, and**
- 3) measure the potential impact of contaminants in road runoff on mussel health**